

The Japanese case of School Curriculum

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There is big change in Japan

All students learn programming

Develop information utilization ability in all subjects

- Elementary School changed in 2020.
- Junior high school will change in 2021.
- High school will change in 2022.

At the same time, we also organized statistical education according to the developmental stage.

Elementary School in Japan

Before 2020

There is no subject
to teach programming.

0 hour for programming



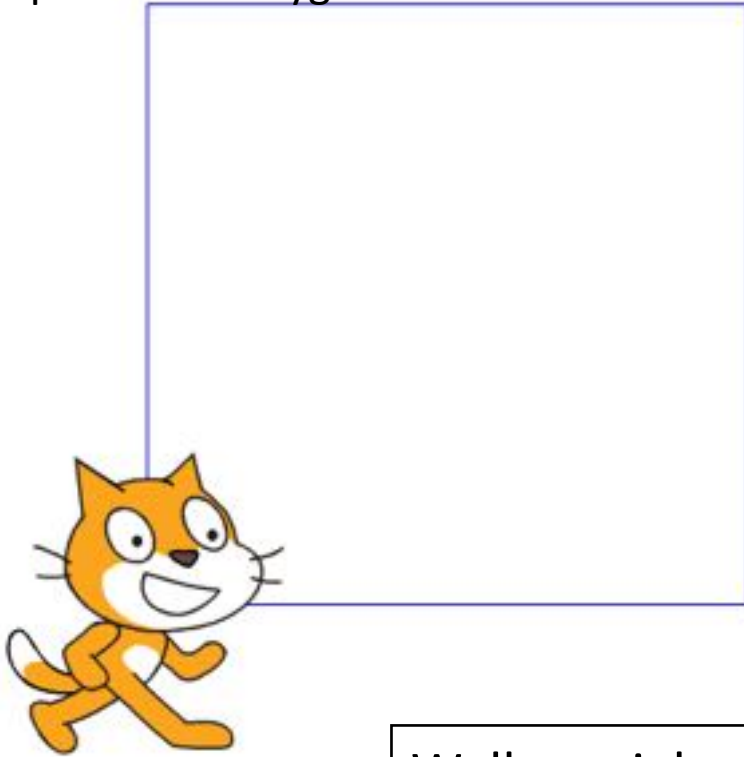
After 2020

Students experience
programming in the subject.

Example
Mathematics, Science,
Comprehensive learning,
etc

About 10 hours or more for programming
Depend on Elementary School

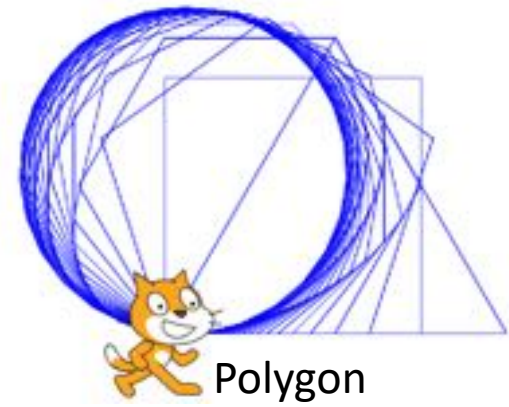
Properties of Polygon



Walk straight
Tern 90 degree
Walk straight
Tern 90 degree
Walk straight
Tern 90 degree
Walk straight
Tern 90 degree

Procedure

Math



Polygon

Programing

Improved

```
a  キーが押されたとき  
  消す  
  ペンを下ろす  
  200 歩動かす  
  90 度回す  
  200 歩動かす  
  90 度回す  
  200 歩動かす  
  90 度回す  
  200 歩動かす  
  90 度回す
```

```
b  キーが押されたとき  
  消す  
  ペンを下ろす  
  4 回繰り返す  
    200 歩動かす  
    90 度回す
```

Heart Rate sensor

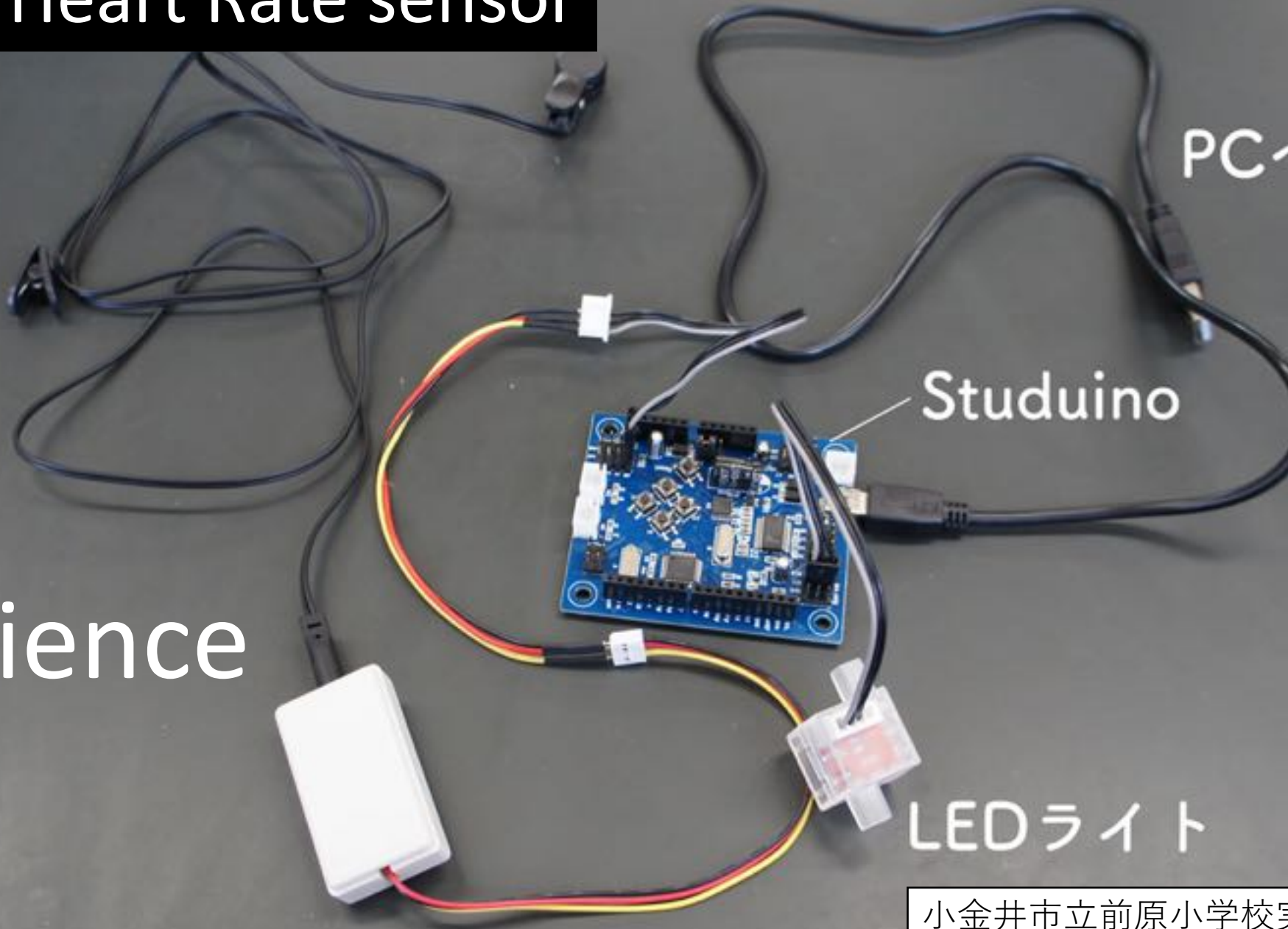
PC

Studuino

Science

LEDライト

小金井市立前原小学校



Junior high school in Japan

Technology and Home Economics (175hour)

Technology part (87.5hour)

Home Economics part(87.5hour)

Inside of Technology part

Materials and their processing

Energy conversion

Nurturing living things

Information processing

About
30hours

Programming hour has doubled
since 2021

Before

2021 Inside of Information processing

Information and communication
networks and information ethics

Design and production of digital works

Automatic measurements and control
programming

About 10 Hours for programming

After

2021 Inside of Information processing

Information technology and information
ethics

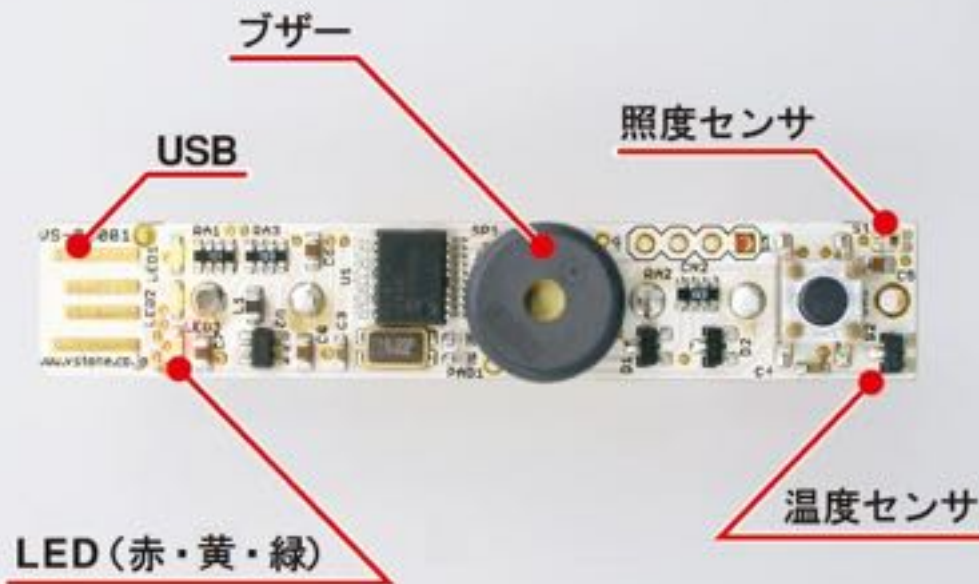
Interactive-bidirection programming by
using network

Automatic measurements and control
programming

Understanding technology concepts and
evaluation, management, improvement, etc

About 20 Hours for programming

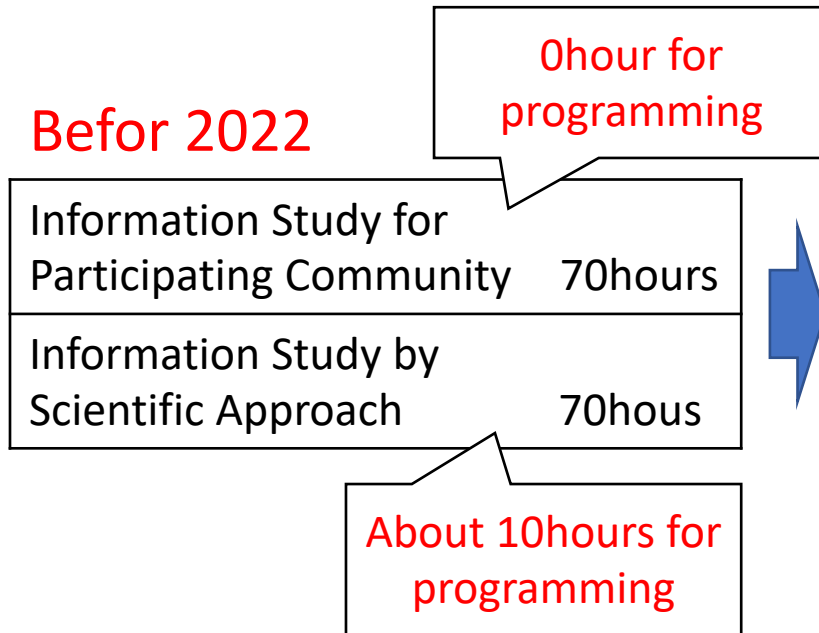
Programing of Measurements Control



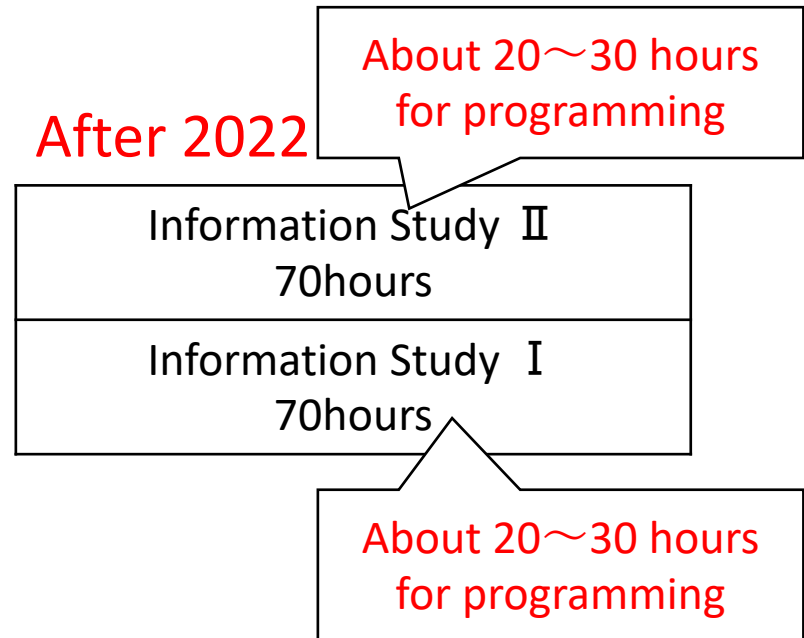
"Information Study I" is being considered as a university entrance examination subject.

High School

Before 2022



After 2022



Take either of 2 courses
Programming hours is depend on choice

Everyone takes
Information Study I

Information Study II
Is advanced elective subjects

Contents of Information Study

- Information Study I

- (1) Problem Solving on Information Society

- (2) Communication and Information Design

- (3) Computer and Programming

- (4) Information Communication Network and Utilization of Data

- Information Study II

- (1) Progress of Information Society and Technology

- (2) Communication and Contents

- (3) Information and Data Science

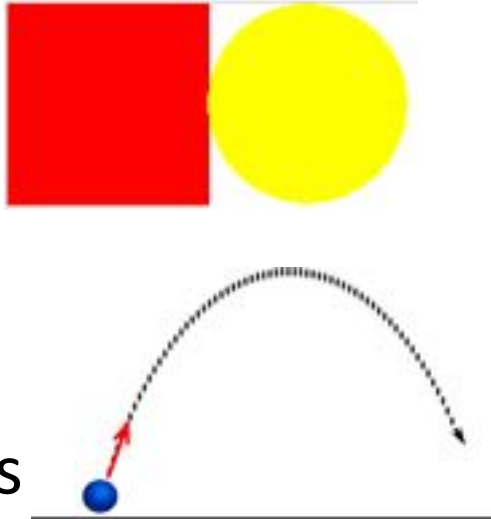
- (4) Information System and Programming

- (5) Inquiry of Problem Finding and Solving by utilizing Information and Information Technology

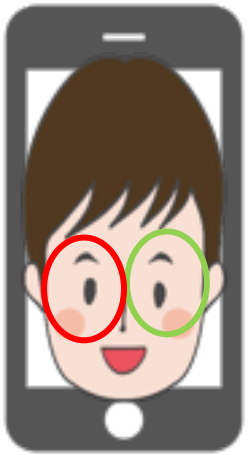
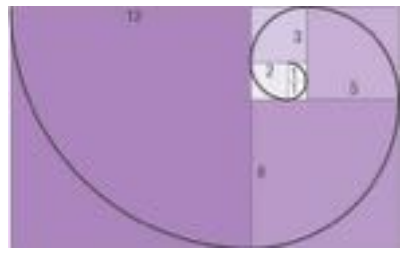
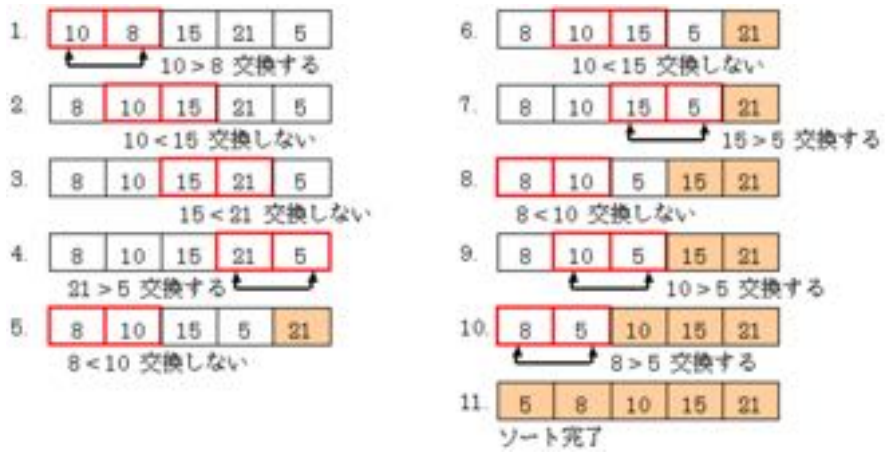
Red letters are related to statistical education and programming education

Information Study I Programming

- Computer system and functions
- Modeling and Simulations
- Various Expressions of Algorithm
- Multiple programming language
- Structured language with a set of functions
- Network is learned at Junior High School



(Ex)Rearrangement (Sorting)



Learn through programing, learn programming, and utilizing programming

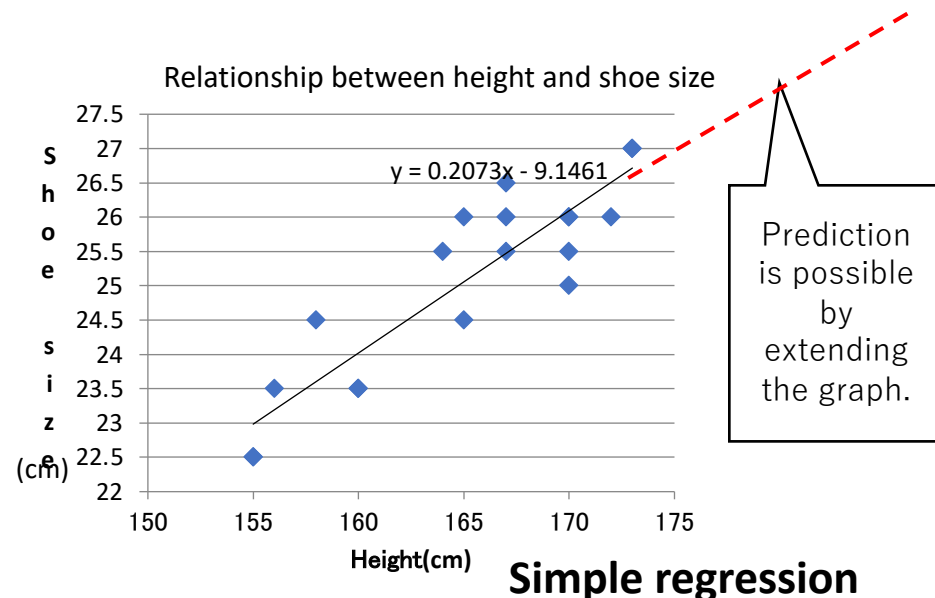
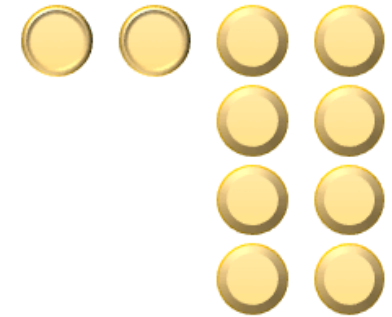
Information Study I Utilizing Data

- Collecting, arranging and analyzing data
- Data handling of different format or levels of scaling
- Qualitative and quantitative data
- Statistical treatment and interpretation

Basics of data Science

Statistical test

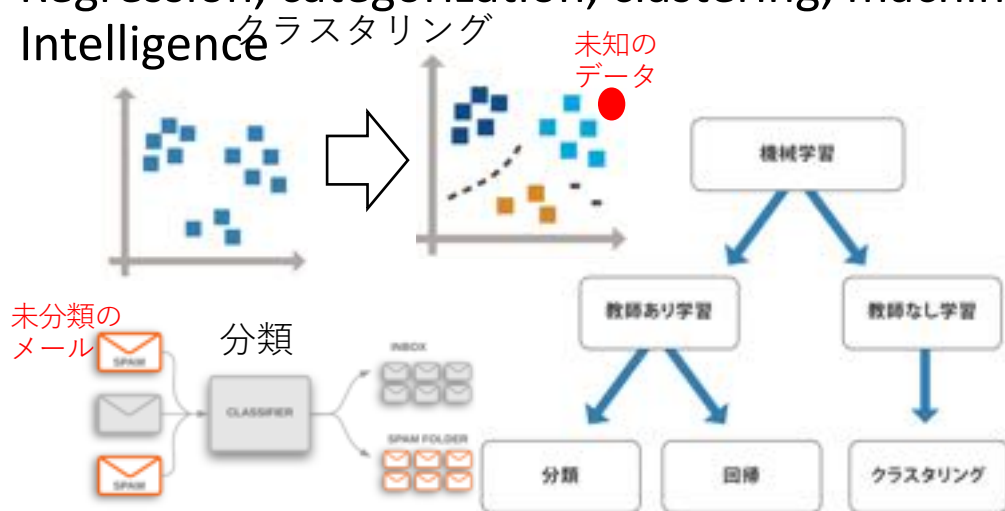
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II Information and Data Science

- Significance of utilizing big and various data
- Role of Data Science in Society
- Data analysis by using data science
- Modeling the phenomena by using data for predications and relations
- Evaluate the conclusions
- Improvements of model, computation, interpretation, and representation
- Data collection, arrangements and formatting
- Treatments of lacking value and out layer, reliance and confidence
- Regression, categorization, clustering, machine learning and Artificial Intelligence

Data
Analysis
↓
Modeling
↓
Prediction
↓
Machine Learning
↓
AI



多様かつ大量のデータの扱い



※メールの分類にはベイズ統計などが使われている

Step by step Learning
According to developmental stage

Elementary School
Simple and Easy

Junior High School
Complex and Abstract

High School
Improvement Through Simulation

Computational Models

Elementary School
Statistical Thinking

Junior High School
Statistical Analysis

High School
Data Science

Machine Learning

**Cross-curricular
Power**
We call
Information Utilization ability

Algorithmic Thinking

High School

Used to find and solve problems

Junior High School

Learn and Utilize

Elementary School

Experience

Based on
Interrelated
concepts

Based on
Information
Design

Teacher training

Training course and Content are provided by:

- Local Government
- Company
- Non-profit Organization
- Academic Conference
- University
- Open University

Also Teaching Materials and Case studies are supplied on the web.